

THURSDAY, MAY 14, 1903.

THE UNIVERSITY AND THE MODERN STATE.

III.

IN our last article on the above subject, we attempted to show the German view of the proper position of the University in a modern civilised community.

We now proceed to give, so far as a careful study of statistics can help us, a similar indication of the view held in the United States; our object being to show the real basis of the recent progress of those nations which are now outstripping us, not only in commercial enterprises, but in other ways where brain-power comes in. We are glad to know that the importance of universities as well as battleships for the maintenance of the life of a nation is at last being recognised.

Any consideration of what the nation has done for higher education in the United States must be prefaced by a reference to two laws passed in 1787 and 1862 respectively. The first Act, enacted for the government of the territory north of the Ohio, provided that not more than two complete townships¹ were to be given to each State perpetually for the purposes of a "university to be applied to the intended object by the legislature of the State." In 1862 an Act was passed giving to each State thirty thousand acres of land for each senator and representative to which the State was then entitled, for the purpose of founding "at least one college, where the leading object shall be, without excluding other scientific and practical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States shall respectively prescribe, in order to promote the liberal education of the industrial classes in the several pursuits and professions of life."²

A reference to Table i. below, showing the number of acres of land in each of the States, the income accruing from which is available for university education, demonstrates more conclusively than any words could do how very fully advantage has been taken throughout the United States of the legislative enactments of 1787 and 1862. The table is due to Dr. Frank W. Blackmar, and is contained in "The History of Federal and State Aid to Higher Education in the United States," published in Washington in 1890.

The grant of 1862 proved insufficient, and in 1890 an Act for the "more complete endowment of the institutions called into being" or endowed by the Act of 1862" was passed.

But these land grants do not exhaust the means adopted by the State to encourage higher education in the United States. In the book to which reference has been made, Dr. Blackmar summarises the principal ways in which the several States have aided higher education. They are as follows:—

- (1) By granting charters with privileges.
- (2) By freeing officers and students of colleges and universities from military duties.
- (3) By exempting the persons and properties of the officers and students from taxation.
- (4) By granting land endowments.

¹ In surveys of the public land of the United States, a division of territory six miles square, containing thirty-six sections.

² "Report of the Commissioner of Education for the Year 1896-7." Vol. ii. p. 1145. (Washington, 1898.)

(5) By granting permanent money endowments by statute law.

(6) By making special appropriations from funds raised by taxation.

(7) By granting the benefits of lotteries.

(8) By special gifts of buildings and sites.

TABLE I.—Land Grants and Reservations for Universities.

| States and Territories. | Acres. | Dates of Grant. |
|----------------------------------|-----------|------------------|
| Ohio | 69,120 | 1792, 1803 |
| Indiana | 46,080 | 1816, 1804 |
| Illinois | 46,080 | 1804, 1818 |
| Missouri | 46,080 | 1818, 1820 |
| Alabama | 46,080 | 1818, 1819 |
| Mississippi | 46,080 | 1803, 1819 |
| Louisiana | 46,080 | 1806, 1811, 1827 |
| Michigan | 46,080 | 1836 |
| Arkansas | 46,080 | 1836 |
| Florida | 92,160 | 1845 |
| Iowa | 46,080 | 1845 |
| Wisconsin | 92,160 | 1846, 1854 |
| California | 46,080 | 1853 |
| Minnesota | 82,640 | 1861, 1857, 187 |
| Oregon | 46,080 | 1859, 1861 |
| Kansas | 46,080 | 1861 |
| Nevada | 46,080 | 1866 |
| Nebraska | 46,080 | 1864 |
| Colorado | 46,080 | 1875 |
| Washington | 46,080 | 1854, 1864 |
| North Dakota } South Dakota } | 46,080 | 1881 |
| Montana | 46,080 | 1881 |
| Arizona Territory ... | 46,080 | 1881 |
| Idaho Territory ... | 46,080 | 1881 |
| Wyoming Territory ... | 46,080 | 1881 |
| New Mexico Territory | 46,080 | 1854 |
| Utah Territory ... | 46,080c | 1855 |
| Total | 1,395,920 | |

The result is, as Prof. Edward Delavan Perry, of Columbia University, has said,¹ "At the present time, in each of the twenty-nine of the States of the Union, there is maintained a single 'State university' supported exclusively or prevaillingly from public funds, and managed under the more or less direct control of the legislature and administrative officers of the State. These States are the following:—Alabama, California, Colorado, Georgia, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, North Carolina, North Dakota, Ohio, Oregon, South Carolina, South Dakota, Tennessee, Texas, Virginia, Washington, West Virginia, Wisconsin and Wyoming.

"The universal verdict of public opinion in the States where such institutions are maintained is that they, as State organisations supported directly by public taxation from which no taxable individual is exempt, should be open without distinction of sex, colour, or religion to all who can profit by the instruction therein given."

The figures necessary to express how much university education in the United States owes to the American Government are large, and the total amount of the aid is enormous. The following table, drawn up with the assistance of the Report of the U.S. Commissioner of Education for the year 1899-1900, will enable the reader to form some idea of the splendid resources placed at the command of American universities. The grand totals under each heading will be found in Tables v. and vi., so arranged as to show the proportion of each total available for the university education of women.

¹ See Prof. Nicholas Murray Butler's monographs on "Education in the United States," vol. i.

TABLE II.—Statistics showing Value, Endowments, Appropriations, Income and Benefactions of Universities and Colleges in the United States in 1899-1900.

| State or Territory. | Value of Libraries, Apparatus, Grounds and Buildings. | Value of Endowments—Productive Funds. | Tuition and other Fees. | Income from Productive Funds. | State, Municipal and U.S. Government Appropriations. | Income from other Sources. | Total Income. | Benefactions. |
|-------------------------|---|---------------------------------------|-------------------------|-------------------------------|--|----------------------------|---------------|---------------|
| | £ | £ | £ | £ | £ | £ | £ | £ |
| Maine | 351,200 | 377,900 | 17,600 | 17,500 | 14,000 | 3,000 | 52,100 | 13,900 |
| New Hampshire | 220,600 | 460,000 | 8,900 | 12,000 | 2,000 | 0 | 22,900 | 70,000 |
| Vermont | 198,700 | 165,000 | 3,600 | 9,100 | 8,100 | 1,500 | 22,300 | 28,700 |
| Massachusetts | 3,084,800 | 4,083,000 | 292,500 | 179,300 | 0 | 50,000 | 521,800 | 257,600 |
| Rhode Island | 301,700 | 259,400 | 19,400 | 15,700 | 0 | 300 | 35,400 | 30,400 |
| Connecticut | 1,577,800 | 1,414,300 | 106,900 | 69,700 | 0 | 5,700 | 182,300 | 156,400 |
| New York | 5,846,400 | 5,681,500 | 289,000 | 257,400 | 48,300 | 111,000 | 705,700 | 363,300 |
| New Jersey | 983,300 | 563,300 | 39,600 | 26,700 | 8,000 | 0 | 74,300 | 47,200 |
| Pennsylvania | 3,075,600 | 2,381,800 | 217,000 | 95,000 | 43,500 | 34,600 | 390,100 | 170,500 |
| Delaware | 34,000 | 16,600 | 300 | 1,000 | 8,000 | 600 | 9,900 | — |
| Maryland | 784,000 | 754,400 | 54,800 | 19,700 | 19,000 | 11,600 | 105,100 | 13,000 |
| Columbia | 974,900 | 279,400 | 34,300 | 14,700 | 20,600 | 14,700 | 14,300 | 14,600 |
| Virginia | 753,000 | 392,600 | 48,200 | 20,500 | 12,800 | 9,400 | 90,900 | 16,400 |
| West Virginia | 119,700 | 33,900 | 4,100 | 1,800 | 28,700 | 3,600 | 38,200 | 10,200 |
| North Carolina | 484,500 | 179,000 | 38,100 | 10,101 | 5,000 | 11,500 | 64,700 | 17,700 |
| South Carolina | 303,400 | 123,800 | 23,700 | 6,800 | 5,900 | 7,800 | 44,200 | 30,400 |
| Georgia | 491,600 | 184,400 | 37,900 | 11,400 | 5,400 | 8,600 | 63,300 | 20,700 |
| Florida | 104,800 | 85,100 | 4,500 | 5,400 | 4,500 | 0 | 14,400 | 3,500 |
| Kentucky | 437,100 | 332,400 | 33,700 | 17,000 | 13,400 | 9,800 | 73,900 | 27,500 |
| Tennessee | 992,000 | 527,000 | 70,200 | 26,900 | 12,700 | 33,700 | 143,500 | 58,800 |
| Alabama | 325,800 | 70,000 | 20,300 | 2,400 | 2,500 | 6,000 | 31,200 | 2,100 |
| Mississippi | 233,000 | 180,300 | 23,800 | 8,300 | 12,900 | 8,000 | 53,000 | 200 |
| Louisiana | 436,300 | 387,900 | 18,800 | 25,000 | 8,600 | 1,700 | 54,100 | 3,000 |
| Texas | 444,600 | 143,900 | 46,000 | 7,600 | 15,600 | 21,000 | 90,200 | 20,100 |
| Arkansas | 133,300 | 33,000 | 10,000 | 2,400 | 13,300 | 1,600 | 27,300 | 3,900 |
| Oklahoma | 14,600 | — | 200 | 0 | 3,800 | 0 | 4,000 | — |
| Indian Territory | 13,500 | 200 | 1,200 | 0 | 0 | 1,000 | 2,200 | 1,800 |
| Ohio | 2,114,900 | 1,901,500 | 91,200 | 84,700 | 64,400 | 26,300 | 266,600 | 133,600 |
| Indiana | 867,200 | 431,100 | 30,900 | 23,000 | 17,500 | 5,200 | 76,600 | 12,300 |
| Illinois | 2,256,000 | 2,310,000 | 199,400 | 96,800 | 61,500 | 31,100 | 388,800 | 386,900 |
| Michigan | 678,800 | 374,600 | 50,000 | 19,300 | 58,700 | 10,600 | 138,600 | 56,800 |
| Wisconsin | 627,300 | 334,000 | 22,800 | 15,300 | 62,800 | 4,500 | 105,400 | 10,400 |
| Minnesota | 627,100 | 332,700 | 35,200 | 15,400 | 35,100 | 8,900 | 94,600 | 15,200 |
| Iowa | 632,500 | 300,800 | 48,400 | 18,900 | 15,000 | 31,600 | 113,900 | 51,600 |
| Missouri | 1,359,800 | 737,300 | 77,200 | 33,800 | 14,900 | 19,600 | 145,500 | 67,400 |
| North Dakota | 47,700 | 8,000 | 1,000 | 600 | 9,100 | 0 | 10,700 | 4,800 |
| South Dakota | 92,400 | 20,000 | 4,600 | 800 | 6,600 | 1,100 | 13,100 | 19,200 |
| Nebraska | 451,300 | 67,300 | 13,700 | 3,800 | 46,400 | 4,400 | 68,300 | 9,400 |
| Kansas | 624,900 | 84,000 | 33,900 | 5,300 | 24,000 | 18,500 | 81,700 | 23,500 |
| Montana | 43,700 | — | 1,900 | 2,000 | 4,300 | 0 | 8,200 | — |
| Wyoming | 43,300 | 1,400 | 100 | 0 | 1,000 | 100 | 11,200 | 0 |
| Colorado | 343,300 | 124,000 | 8,000 | 7,400 | 14,400 | 2,200 | 32,000 | 46,600 |
| New Mexico | 16,500 | — | 100 | 0 | 2,200 | 0 | 2,300 | 2,700 |
| Arizona | 30,900 | — | — | 0 | 10,000 | 500 | 10,500 | — |
| Utah | 126,900 | 51,400 | 2,900 | 1,300 | 12,300 | 2,900 | 19,400 | 800 |
| Nevada | 50,400 | — | — | — | 11,400 | 0 | 11,400 | — |
| Idaho | 49,900 | — | 0 | 0 | 10,000 | 0 | 10,000 | 0 |
| Washington | 269,600 | 37,700 | 11,000 | 2,500 | 10,000 | 500 | 24,000 | 45,500 |
| Oregon | 124,900 | 89,000 | 5,200 | 4,400 | 6,000 | 900 | 16,500 | 5,600 |
| California | 1,376,000 | 4,250,200 | 41,100 | 78,500 | 55,300 | 3,500 | 178,400 | 11,300 |

But, as readers of NATURE are well aware, the universities and colleges of the United States have another source of income in addition to the generous provision made by the State. Every year wealthy American citizens place large sums of money at the disposal of the educational authorities for the purposes of higher education and the encouragement of scientific research. During the eleven years 1890-1901, the amount of these donations reached the grand total of nearly 23,000,000*l.*, as Table iii., compiled by Prof. Nicholas Murray Butler, shows:—

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TABLE III.—Total amount of Benefactions¹ to Higher Education in the United States.

| Reported in | £ | Reported in | £ |
|----------------|-----------|------------------|-----------|
| 1890-91 | 1,515,018 | 1896-97 | 1,678,187 |
| 1891-92 | 1,336,917 | 1897-98 | 1,640,856 |
| 1892-93 | 1,343,027 | 1898-99 | 4,385,087 |
| 1893-94 | 1,890,101 | 1899-1900 | 2,399,092 |
| 1894-95 | 1,199,645 | 1900-01 | 3,608,082 |
| 1895-96 | 1,810,021 | | |

¹ Compiled by Prof. Nicholas Murray Butler, Columbia University, and published in "Special Reports on Educational Subjects," vol. xi. part ii.

From 1871-1890, the total amount of benefactions for education of the kind with which this article is concerned, was, the annual reports of the U.S. Bureau of Education show, 16,285,000*l.*, so that for the years 1871-1901, the grand total of forty millions sterling was raised by private effort for American university education.

The question naturally presents itself: What has been done by private effort in this country to assist university education during the same period? Compared with American munificence, the amounts given and bequeathed here are very small. Take in the first place the university colleges, which are largely to be regarded as a growth of the years under consideration. The financial statements contained in the "Reports from University Colleges, 1901," published by the Board of Education, reveal the fact that, including the 400,000*l.* raised for the University of Birmingham, the benefactions to the fifteen university colleges in Great Britain amounted during 1870-1900 to a little more than three millions. In the absence of systematic reports during the same period of the financial resources of the older universities of the United Kingdom, it is difficult to estimate the amount of benefactions received by them during the same thirty years. The parliamentary returns which have been published since 1898, showing the revenue of Scottish universities, suggest that their benefactions in the same time, excluding

Mr. Carnegie's splendid gift, may be put at something under half a million, so that for the whole of the United Kingdom the total amount of endowment from private sources raised in these years may, without any risk of under-estimation, be said to be considerably less than five millions.

To give some idea of the result of the broad-minded policy of the legislatures of the several States and of the treatment which higher education has received at the hands of American statesmen and men of wealth, the following short summaries have been drawn up, with the assistance of the Report of the Commissioner of Education of the United States Bureau at Washington, published in 1901, for the year 1899-1900. The first (Table iv.) shows the number of colleges having endowments of certain specified amounts. The second summary (Table v.) shows the total property of all American university colleges, tabulated under the headings of fellowships and scholarships; values of libraries, apparatus, grounds and buildings; and of their productive funds. The next (Table vi.) shows the amounts of income of these colleges, and the last (Table vii.) gives the total number of professors, instructors and students in colleges of university standing.

It is interesting in this connection to compare the number of students taking university courses in this country with those in Germany and the United States. With this object in view, Table viii. has been pre-

TABLE IV.—*Classification of Colleges and Universities for Men and for both Sexes, according to Amount of Endowment Fund.*

| £ | to | £ | ... | ... | ... | 56 |
|----------------|----|-----------|-----|-----|-----|----|
| 20,000 | | 40,000 | ... | ... | ... | 38 |
| 40,000 | " | 60,000 | ... | ... | ... | 13 |
| 60,000 | " | 80,000 | ... | ... | ... | 14 |
| 80,000 | " | 100,000 | ... | ... | ... | 7 |
| 100,000 | " | 120,000 | ... | ... | ... | 4 |
| 120,000 | " | 140,000 | ... | ... | ... | 5 |
| 140,000 | " | 160,000 | ... | ... | ... | 2 |
| 160,000 | " | 180,000 | ... | ... | ... | 1 |
| 180,000 | " | 200,000 | ... | ... | ... | 8 |
| 200,000 | " | 250,000 | ... | ... | ... | 5 |
| 250,000 | " | 300,000 | ... | ... | ... | 3 |
| 300,000 | " | 400,000 | ... | ... | ... | 4 |
| 400,000 | " | 600,000 | ... | ... | ... | 4 |
| 600,000 | " | 800,000 | ... | ... | ... | 1 |
| 800,000 | " | 1,000,000 | ... | ... | ... | 2 |
| 1,000,000 | " | 1,500,000 | ... | ... | ... | — |
| 1,500,000 | " | 2,000,000 | ... | ... | ... | 3 |
| Over 2 000,000 | | ... | ... | ... | ... | 3 |

TABLE VII.—*Professors, Instructors and Students in Universities and Colleges of United States.*

| Institutions. | Professors and Instructors. ¹ | |
|---|--|--------|
| | Men. | Women. |
| For men and for both sexes (480 institutions) ... | 12,664 | 1,816 |
| For women (141 institutions) | 697 | 1,744 |
| | Students. | |
| | Men. | Women. |
| Total number of students in universities and colleges | 61,800 | 35,300 |

TABLE V.—*Property of Universities and Colleges in the United States (1899-1900).*

| Description of institution. | Number of fellowships. | Number of scholarships. | Value of libraries. | Value of scientific apparatus. | Value of grounds and buildings. | Productive funds. |
|--------------------------------|------------------------|-------------------------|---------------------|--------------------------------|---------------------------------|-------------------|
| For men and for both sexes ... | 476 | 7,619 | £ 2,138,000 | £ 3,027,000 | £ 27,267,000 | £ 29,478,000 |
| For women ... | 18 | 447 | £ 132,000 | £ 157,000 | £ 3,129,000 | £ 1,088,000 |

TABLE VI.—*Income of Universities and Colleges in the United States (1899-1900).*

| Description of institution. | Fees. | From productive funds. | State or municipal appropriations. | From United States Government. | From other sources. | Total income. | Benefactions. |
|-----------------------------|-------------|------------------------|------------------------------------|--------------------------------|---------------------|---------------|---------------|
| For men and for both sexes | £ 1,675,000 | £ 1,222,000 | £ 691,900 | £ 197,000 | £ 393,000 | £ 4,179,000 | £ 2,168,000 |
| For women ... | £ 468,000 | £ 57,000 | £ 7,000 | — | £ 136,000 | £ 670,000 | £ 118,000 |

¹ Excluding duplicates.

pared, but it should be pointed out that the number of students in our university colleges includes all above the age of sixteen, which is probably much lower than the age of the students included in the totals for other countries. It is well to remember, too, that the number of American university students is probably too high for a fair comparison with those of Germany. Many university students in the United States are really students in the higher branches of technology, and would in Germany study in technical high schools, the students of which are not included in Germany's total in the table. To make the comparisons as simple as possible the number of university students per ten thousand of population has been calculated.

TABLE VIII.—*Number of University Students per 10,000 of Population (1900).*

| Country. | Population. | Number of Students. | | | Number of Students per 10,000 of Population. |
|----------------|-------------|---------------------|-------------|---------|--|
| | | Universities | Day, 12,000 | Evening | |
| United Kingdom | 41,164,000 | University Colleges | 8,500 | 5,000 | 4.98 ¹ |
| German Empire | 56,367,000 | | 44,400 | | 7.87 |
| United States | 76,086,000 | | 97,100 | | 12.76 |

The statistics provided above make it possible to form a good estimate of the comparative amounts of importance attached to higher education in this country and in the United States. Table vi. shows that, neglecting the income accruing from the State land grants, the legislatures of individual States and the U.S. Government together supplied about 900,000*l.* for university education during 1899–1900, while the article in NATURE for March 12, 1903, shows that the total State aid to universities and colleges in the United Kingdom at present amounts only to 155,600*l.* Table vi. also brings out another important principle; it reveals the fact that during 1899–1900 private effort provided more than two and a quarter millions sterling for the colleges of the United States, and thus leads to the conclusion, which is strengthened by Table iii., that interest on the part of the State in higher education leads to a corresponding enthusiasm among men of wealth.

A comparative study of this kind is of vital national interest; our very existence as a nation depends directly upon success in that industrial warfare between the great countries of the world from which there can be no peace. The last article in this series has shown the great importance attached by German statesmen to the higher education of the directors of German industries, and how greatly superior is the provision made for this purpose in Germany to that in this country. A similar conclusion is reached by studying the subject from the American point of view; we are equally behind the United States. Unless our Government, on one hand, and our men of wealth on the other, take immediate steps, and make serious efforts to remedy these deficiencies in our higher education, British manufacturers cannot hope to hold their own successfully with either German or American competitors. The amount by which we fall short of the United States, the deficiency which must be made good simply to bring us level with America in the race

for industrial supremacy, will be seen from the following deductions from the above statistics:—

(1) The amount raised during 1871–1901 by private munificence for higher education was, in the United States, more than eight times that similarly provided in the United Kingdom.

(2) In addition to the large income from State land grants, the amount provided by the State for higher education is, in the United States, six times as much as the Government grant for the same purpose in the United Kingdom, where there is nothing corresponding to the land grants.

(3) In the United States there are 170 colleges with an endowment of more than 20,000*l.*; forty-nine of these have endowments of more than 100,000*l.*, and three of more than two millions sterling. In the United Kingdom there are thirteen universities and twenty other university colleges. Four of the universities do little more than examine.

(4) In the United States nearly thirteen of every ten thousand inhabitants are studying during the day at colleges of university status; the number in the United Kingdom is less than five.

(5) The value of the endowments of institutions of higher education in the single State of New York exceeds the total amount of benefactions for similar purposes raised during thirty years in the whole of the United Kingdom. The same is nearly true in the States of Massachusetts and of California.

(6) The number of *professors and instructors* at the universities and colleges included in the list of the U.S. Commissioner of Education is 17,000. The number of *day students* in our universities and university colleges is only about 20,500, so that there are almost as many university *teachers* in the United States as there are university *students* in the United Kingdom!

In considering what should be the strength of the British Navy, the first line of national defence as it is called, it is commonly said that we must aim at making it equal to the combined fleets of any two first-class powers. When rightly regarded, the development of the brain-power of the nation is, in view of the fact that the ability to keep up the Navy depends upon commercial success, of even greater importance. Our provision of higher education, far from being equal to that of two of our chief competitors together, is by no means equal to either of them singly.

A careful study of the tables here brought together will do more than anything else to explain the success which has attended American manufactures and commerce in recent years. America has learnt that to energy and enterprise must be added trained intellect and a familiarity with recent advances in science. Other things being equal, that nation will be most successful in the competition for the markets of the world which makes the most generous provision for the higher education of its people.

We are glad that even if the Government is supine, our captains of industry are waking up, and we may conclude by a reference to the *Times* report of the speech delivered by Sir John Brunner at the remarkable gathering in connection with the Liverpool School of Tropical Medicine on Monday last, in which he repeated what he had already said to Sir Norman Lockyer in private.

"If we as a nation were now to borrow ten millions of money in order to help science by putting up buildings and endowing professors we should get the money back in the course of a generation a hundredfold. There was no better investment for a business man than the encouragement of science, and he said this knowing that every penny he possessed had come from the application of science to commerce."

¹ Excluding Evening Students of University Colleges.